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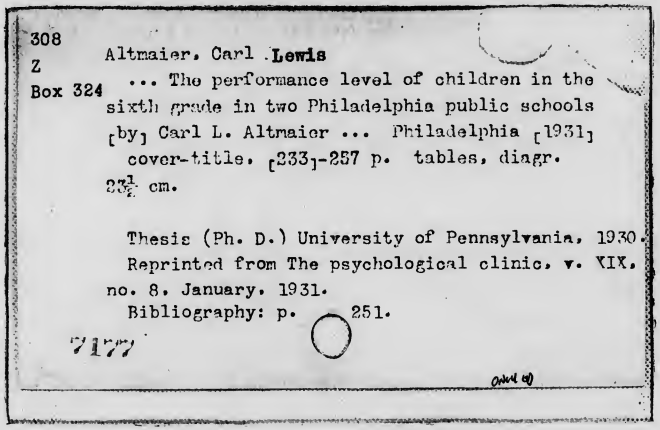

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The Performance Level of Children in the Sixth Grade in Two Philadelphia Public Schools

CARL L. ALTMAIER

A THESIS
IN PSYCHOLOGY
PRESENTED TO THE FACULTY OF THE GRADUATE SCHOOL IN
PARTIAL FULFILLMENT OF THE REQUIREMENTS FOR
THE DEGREE OF DOCTOR OF PHILOSOPHY

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THE PERFORMANCE LEVEL OF CHILDREN IN THE SIXTH GRADE IN TWO PHILADELPHIA PUBLIC SCHOOLS

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INTRODUCTION

"The differential diagnosis in clinical psychology is a quantitative diagnosis which puts the individual in the group to which he belongs, and defines the group in terms of a number of inferiors and a number of superiors."[1] A diagnosis follows the observation of the responses of an individual to various external stimuli. These external stimuli are usually controlled situations known as "mental" or psychological tests. A large number of tests have been devised in the extensive development of mental testing technique, and recently more attention has been given to the development of norms. It has been one of the aims of the Psychological Clinic of the University of Pennsylvania, under the direction of Dr. Lightner Witmer, to establish standards for the comparison of the performances of children in a few psychological tests. The object has been to make a comprehensive survey of individual performances so that a comparison of the performance of any child can readily be made with the standards of performance of a number of children. A number of studies have been made, and several sets of standards have been determined which have proved satisfactory in clinical diagnosis. The studies of Leaming, Easby-Grave, and Murphy have supplied norms of performance which are continually being used in the Psychological Clinic. Comparison can be made with these norms, and an individual ranked in terms of relative superiority-inferiority.

[1] Lightner Witmer, Psychological Diagnosis and the Psychonomic Orientation of Analytic Science. *The Psychological Clinic*, January-February, 1925, Vol. XVI, Nos. 1-2, page 5.

"A psychological diagnosis," according to Witmer, "is an interpretation of the observed performances of human beings."[2] The function of the clinical diagnostician is not only to use quantitative instruments. Tests do not have such reliability that it is possible to dispense with interpretation and judgment. "The judgment of the diagnostician in clinical psychology begins to operate at the very point where psychometrists and group testers cease to function."[3] Norms and statistical criteria are not final, but only serve as aids to the clinical psychologist. The more reliable the norms, and the larger the number of standards of performance, the greater assistance will the psychological clinician have in making a diagnosis.

This is an investigation of a group of children in the sixth grade in two Philadelphia public schools. The group differs from the fifth grade in efficiency where "efficiency is the ability or power to produce effects, that is, effectability."[4] The sixth grade child has not arrived at the point of liminal social efficiency, but has arrived at some point of supraliminal human efficiency, at a level which has surpassed that of the fifth grade child. If the fifth grade child possesses liminal intellectual efficiency, the sixth grade child possesses supraliminal intellectual, as well as supraliminal human efficiency. This investigation is an examination of a group of children who have surpassed those in the fifth grade.

The purpose of this study is to present a statistical analysis of the performance of a group of children in the sixth grade that will have bearing upon clinical diagnosis. This requires the determination of the amount of performance, which will represent the proficiency of the children selected. Proficiency is demonstrated ability in a competitive event. This study presents a picture of the proficiency of children in the sixth grade in public school. The group is a sampling of all sixth grade children.

The Group

The sixth grade is the last grade in the elementary school system. The child who completes this grade can continue in the Junior High School, or can go to work. The community feels that he has sufficient proficiency to take care of himself in a limited or minimum

[2] Lightner Witmer, ibid., page 4.

[3] Lightner Witmer, ibid., page 8.

[4] Miles Murphy, The Ten Year Level of Competency. *The Psychological Clinic.* May-June 1928, Vol. XVII, Nos. 2-3, page 37.

fashion. In the public schools in Pennsylvania children who pass the sixth grade may secure a working permit even though they are not sixteen years of age. The child is considered to have developed sufficient efficiency, and to have reached that proficiency level at which he can leave school and go to work, although he is not yet considered capable of taking his place in society and maintaining entirely his own support.

Four hundred cases have been selected in two of the schools of the Philadelphia district. These schools are located in the West Philadelphia section, and include children who come from the average, or modal family, the sixty per cent median modal family. The families are not of the very poor class, nor are they of a high social class. Each child was asked the occupation of his father, and the occupations with the corresponding frequency of each are as follows: Clerks, twenty-four; Carpenters, twenty-one; Tailors, seventeen; Manufacturers (manual work), thirteen; Machinists, twelve; Plumbers, ten; Painters, ten; Grocers, nine; Mechanics, nine; Brakemen, eight; Conductors, eight; Railroad engineers, eight; Laborers, seven; Contractors, six; Firemen, six; Chauffeurs, five; Hauling, five; Printers, five; Bakers, four; Electricians, four; Furriers, four; Inspectors, four; Laundrymen, four; Policemen, four; Builders, three; Mechanical engineers, three; Gardeners, three; Ironworkers, three; Motormen, three; Teachers, three; two each of the following: Blacksmiths, Bellhops, Bookbinders, Cabinet makers, Dentists, Doctors, Florists, Icemen, Lathers, Merchants, Railroad maintenance, Newspapermen, Operators, Postmen, Upholsterers; one each of the following: Awning maker, Butcher, Bartender, Booking Agent, Barber, Blasting, Buttonmaker, Brickmaker, Caterer, Cook, Cement, Constructor, Truck driver, Designer, Engraver, Garage owner, Glassmaker, Hosemaker, Hosiery, Hotel, Janitor, Lumberman, Milkman, Milk supplies, Porter, Paperhanger, Plasterer, Photographer, Piano polisher, Peddler, Patternmaker, Pharmacist, Roofer, Rugs, Tinsmith, Waiter, Weatherstripper, Welder; Deceased, twenty-nine; No Occupation, seventeen.

The group as a whole can be classed, following the grouping of Taussig, generally as the class of skilled workmen and the lower middle class. No investigation was made of the home conditions, but indications from the child lead to the judgment that all are in very moderate circumstances. The children were in most cases neat and clean, but shabbily dressed. They were white children with the exception of nine. Of the children examined 2.3 per cent were colored.

The Tests

In the testing of cases in the Psychological Clinic of the University of Pennsylvania it has been the aim to limit the examination to as small a number of tests as possible. It has been through the process of development that some tests have been discarded and some have been retained. Five tests which are used with a great deal of frequency are the five tests which have been retained for use in this investigation. These are the Witmer Formboard, the Witmer Cylinders, the Dearborn Formboard IC, the Memory Span (Auditory, Visual, and Reverse), and the Stanford Revision of the Binet-Simon Intelligence Tests.

Three of the tests used are of the type commonly referred to as formboard tests. They have had a prominent place in all groups of clinical tests. They are largely tests of efficiency for sixth grade children. The Witmer Formboard furnishes an opportunity to secure rapport with the subject and develops interest in the examination. A number of the children were amused at the ease of this performance, and even occasionally showed chagrin at being asked to do something so simple. The test is sufficiently easy so that no child in this group will fail, and in most cases the subject is inspired to attack the later problems with confidence.

These tests can be used successfully as psychological and clinic tests at any age. The kind of performance can be noted, and many abilities observed by the examiner. A quantitative comparison can be satisfactorily made at any age where proper norms have been established. These tests will often prove serviceable in the examination of the adult.

The directions for giving the tests, and the method of scoring, are the same as in the procedure in "The Ten Year Level of Competency." There is one exception. It had been found that the time limit of ten minutes for the Dearborn Formboard was too long for the group in the fifth grade, for it allowed too much opportunity for chance solutions. The time limit for the Dearborn Formboard in this investigation was reduced to five minutes, which becomes the uniform time for the three performance tests.

Procedure

The investigation was undertaken through the inspiration of Dr. Lightner Witmer, and its successful completion has been due to his helpful criticisms and suggestions. Dr. Miles Murphy aided in the carrying out of the work. He took an active part in the examination of a number of cases. The investigation was begun in the latter part of October, 1927, and continued until the first part of March, 1928, and its careful and successful completion was furthered by the staff of examiners who generously gave of their time. The following conducted the examinations: Dr. Miles Murphy, Instructor in Psychology at the University of Pennsylvania, Edward M. Twitmyer, Instructor in Psychology, Frank R. Gillespie, Assistant in Psychology; the members of the staff of the Psychological Clinic of the University of Pennsylvania, Miss Genevieve McDermott, Executive Officer of the Clinic, Miss Lorraine L. McNally, Clinic Teacher, Miss Marion R. Braungard, Social Worker, Miss Helen E. Roberts, Recorder; and Miss Maybelle Kling, Graduate Student in Psychology, and the writer. All of these examiners had had considerable experience in the theory and practice of mental testing, and were very familiar with all the procedures and the tests that were used.

The four hundred cases were examined as they were found in the individual rooms. There were one hundred and eighty-nine boys and two hundred and eleven girls. There were one hundred and eighty-six children in the Six A Grade and two hundred and fourteen in the Six B Grade.

The manner of conducting the examinations was similar to that followed in "The Ten Year Level of Competency." The writer was one of the examiners in the previous investigation, as were Dr. Murphy, Miss McDermott, Miss McNally, and Miss Roberts. There were usually four examiners present, and four children were tested at the same time. In one instance a vacant class room was used. The children were placed in different parts of the room. In another instance a large vacant room in the basement of the school was available, in which tables and chairs were placed at widely separated distances. Two of the examiners gave the Witmer Formboard, the Witmer Cylinders, and the Dearborn Formboard, and the Memory Span Tests, two others gave the Binet-Simon Tests. A face sheet was used for each child, upon which were placed the date of examination, name, address, age, date of birth, father's occupation, and spaces for recording the length of time required for the performance of each test, and the score on the Binet-Simon Tests. No major attention was paid to the qualitative aspect of the performance.

Treatment of Results

The range of chronological ages of the children in this group is from nine years and seven months to sixteen years and three

months. The group is composed of a number of children of several different chronological ages. It is of interest to know whether the performance of the group as a whole is representative of any particular age group found within the whole. A number of age subgroups have been selected from this main group which will indicate the performance of children of different ages. There is diversity of opinion among investigators as to the definition of an eleven year old child, a ten year old child, etc. The simplest criterion is the birthday of the child. An eleven year old child is one who is eleven years of age on the day of the examination. For practical purposes it is impossible to employ this. It would require an impracticably large group of examiners, and would take a prohibitively long period of time to examine children only on their birthdays. The decision must be made as to whether one day from the birthday, one month, six months, or even a year will make a difference. The determination of the age of a child must be arbitrary. For purposes of this investigation children have been selected as of a particular age when they are that age or over, but less than the next higher age. An eleven year old child is one who has arrived at his eleventh birthday, but who has not yet reached his twelfth birthday.

For the purpose of comparing the performances of the entire group with the performances of different age sub-groups, the children of the ages of ten, eleven, twelve, thirteen, and fourteen years have been selected. It will be possible to determine whether the performance of the sixth grade is representative of the performance of any of these age sub-groups.

There are one hundred and eighty-nine boys and two hundred and eleven girls in the entire group. A comparison of the data obtained from the boys with that obtained from the girls will make it possible to determine whether there are any differences between the performances of the boys and the girls. A comparison of the data obtained from the boys and girls and that obtained from the entire group will make it possible to determine whether the boys and the girls are representative of the entire group.

There are one hundred and eighty-six children in the Six A Grade, and two hundred and fourteen children in the Six B Grade. It is customary in the Philadelphia school system to promote at the half year. Six A is the first half of the sixth grade, or the lower section of the group, and Six B is the second half of the sixth grade, or the upper section. By a comparison of the results obtained from Six A and Six B, it can be ascertained whether there are any differences between these two groups. It can be determined whether either of these divisions is representative of the entire group.

A group has been selected from which the children at the extremes in chronological age have been removed. The youngest children in the group and the oldest children have been eliminated. In this way the children who are retarded in grade have been discarded, as well as those who are advanced. Twenty per cent of the children have been removed from each end of the distribution. This leaves a sixty per cent median modal age group. It can be determined whether this group is different in performance, or whether it is similar in performance, to the entire group. If the performance is the same for both groups a sixty per cent median modal age group can be used for an investigation of this sort, instead of the larger number of cases in the entire group. This will lead to saving of time and effort.

There are involved in this data a number of groups of children in the sixth grade. Forty-three Cases, 10 years of age; 164 Cases, 11 years of age; 96 Cases, 12 years of age; 43 Cases, 13 years of age; 36 Cases, 14 years of age; 400 Cases in the entire group; 240 Cases in the sixty per cent median modal age group; 189 Males; 211 Females; 186 Cases in the Six A Grade; and 214 Cases in the Six B Grade. There are 6 Cases, 9 years of age; 11 Cases, 15 years of age; and 1 Case, 16 years of age. These three latter groups are composed of too few cases to be useful for purposes of statistical treatment.

The data or results obtained from these children include Chronological Age, Mental Age, Intelligence Quotient, Memory Span: Auditory, Visual, and Reverse, Witmer Formboard: first and second trial, Witmer Cylinders: first and second trial, and Dearborn Formboard: first and second trial. The proficiency of each group will be represented by the results in these tests.

From the data the following measures have been calculated: the average or mean of the distributions, indicating the central tendency; the skewness, showing the correspondence of the curves to the normal probability curve; the standard deviation or sigma of the distributions, and the coefficient of variability, indicating the variability of the groups; the probable error of the averages, showing the reliability of the averages; and the difference divided by the sigma difference, indicating the significance of the difference between the averages of any two groups. This last measure shows the number of chances in one hundred that the difference between

any two averages is a true difference. These measures have been determined from the frequency tables of distribution. In the Memory Span results the scores are in discrete series. In each case the curve of the distribution has been determined.

The formulae used for the calculation of the average of the distribution, the standard deviation or sigma of the distribution, the skewness, the coefficient of variation, the probable error of the average, the sigma of the average, and the sigma difference, are given in "Statistics in Psychology and Education," by Henry E. Garrett. The short method was used for the average of the distribution and for the sigma of the distribution. The formula used for the median, short method, is found in "The Fundamentals of Statistics," by L. L. Thurstone.

In order to determine the significance of the difference between the entire group and a sub-group the following formula was used:

$$\sigma \text{ diff.} = \sqrt{\frac{\sum^2}{N} + \frac{\sigma^2}{n}\left(1-\frac{2n}{N}\right) - \frac{n\,(M-m)^2}{N\,(N-n)^2}}$$

$\sum$ = standard deviation of the total group.
N = number of cases of the total group.
σ = standard deviation of the sub-group.
n = number of cases of the sub-group.
M = average of the total group.
m = average of the sub-group.

This formula is given by Pearson in *Biometrika*, Vol. V, p. 182. The results of this statistical treatment are found on pages 252-255.

The writer is indebted to Dr. Morris S. Viteles, Assistant Professor of Psychology at the University of Pennsylvania for his helpful suggestions concerning the statistical treatment of results.

For purposes of discussion in this study the data will be grouped in a general way under three headings: chronological age, intellectual tests, and performance tests. Mental Age, the Intelligence Quotient, and the Memory Span tests: Auditory, Visual, and Reverse, will be included under the term intellectual tests. This is not only because these are predominantly measures of organization and discernment, but also because they are tests which do not primarily involve manual and motor manipulations. The Witmer Formboard, the Witmer Cylinders, and the Dearborn Formboard will be classed as performance tests, because muscular and motor manipulations are involved to a greater extent than in the former. This classification is arbitrary, but useful for purposes of discussion in this study. Motor responses are involved in all of the tests used,

as are organization and discernment, but the preponderance of these factors is greater in one group than in the other.

The results of all tests have been arranged in decile tables which are found on pages 256-257 so that ready comparison can be made with any individual performance, and a subject rated in terms of relative superiority-inferiority. This is accomplished by placing the individual in a group, superior to some and inferior to others. This is expressed by saying that A is Superior to X and Inferior to Y, where A is the individual, X and Y the groups to which he is related. The results shown in these tables can be readily compared with the results shown in the tables which have been determined for other levels. The writer, in another study, will make a comparison of this group with other groups in terms of these decile ratings.

Analysis of Results

Entire Group

The children of ten, eleven, twelve, thirteen, and fourteen years of age have been compared with the entire group. The $\frac{\text{Diff}}{\sigma \text{ diff}}$ for the average results of all tests, when the chronological age sub-groups are compared with the entire group is shown in the table of results. A $\frac{\text{Diff}}{\sigma \text{ diff}}$ of three or over represents a significant difference between groups. Every age sub-group shows some difference from the entire group. There is no one group which is sufficiently like the entire group in average scores, so that it can be said to be representative of the entire group. The sixth grade can not be definitely called a chronological age level. The twelve year group shows the least difference from the entire group in the greatest number of instances. In the results of seven tests the twelve year olds show the least amount of difference. The entire group more nearly represents the twelve year level than any other.

Other investigations have determined the ages at which the Witmer Formboard and Witmer Cylinders are difficult enough to require the child to use intelligence. The Dearborn Formboard has not been definitely located with reference to an age group. No failures are made on the Witmer Formboard, 1.5% of the children fail on the Witmer Cylinders, first trial, and 22.5% fail on the

Dearborn Formboard, first trial, in the entire group of sixth grade children.

The curve of the distribution shows a skewness of +.71 and +.39 on the first and second trials, respectively, of the Witmer Cylinders, and +.56 and +.82 on the first and second trials of the Dearborn Formboard for the entire group. The scores are grouped at the lower end of the distribution. This means that the Witmer Cylinders and Dearborn Formboard are too easy for this group when the time limit is five minutes. A satisfactory test would result in a distribution of scores approaching the distribution of the normal curve. The skewness on the first trial of the Witmer Formboard is +.11, and on the second trial is +.24. All the scores are well within the time limit, the greatest time being sixty seconds. The Witmer Formboard is the easiest of the three tests.

It is important to point out that the significance of the differences is obscured in certain instances by the fact that the distribution of results in the case of the performance tests does not follow closely the normal curve. In general, the distribution of the Binet-Simon I. Q's, and of the forward memory span test ap-

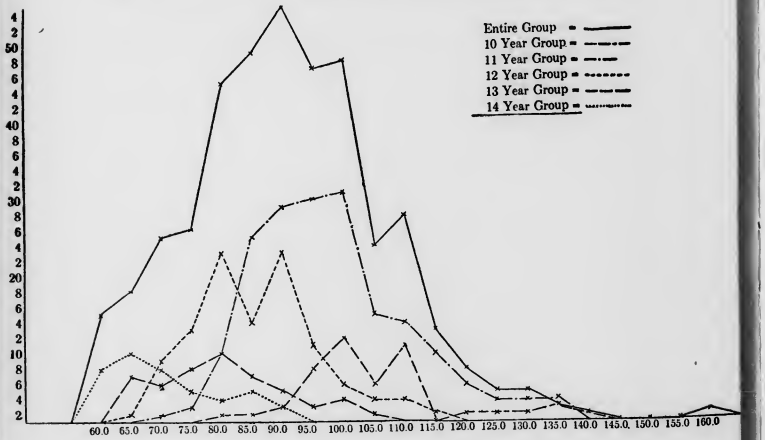

Chart I. Distribution of Intelligence Quotients.

proach that of a normal curve more nearly than do the performance test scores.

The distribution of Mental Age and Intelligence Quotient scores in the entire group approach the normal curve of distribution. The skewness in the former is +.13, in the latter +.08. This indicates that the results are fairly representative of sixth grade children. The curves of distribution of the entire group and the chronological age sub-groups in Intelligence Quotient are shown in Chart I. There is a slight tendency toward the lower scores. The average Intelligence Quotient for the group is 93.1, median 92.6. According to Terman the average Intelligence Quotient should be 100.

It has been pointed out by some that there is a greater possibility of making a high Intelligence Quotient at the earlier ages than at the later. The younger child has the chance to make a score in many more tests, for there are opportunities at every age level up to the superior adult. The increase in difficulty of the tests is a yearly one at the younger ages. After ten the interval is two years. The child of eleven years of age must pass at least some tests at the twelve year level in order to make an Intelligence Quotient Score of 100. The tests themselves at some of the ages are probably too difficult. There are several opinions that this is true of tests at the higher ages. Wallin[5] has pointed out that "the Stanford norms . . . . tend to be too difficult in most of the ages." He says, "From the tabulation of Porteus's data the age-standards appear too easy for ages five and six, slightly so for age seven, slightly too difficult for ages nine and ten, and perceptibly too difficult for the higher ages. Examiners using the Stanford revision for purposes of practical diagnosis must make due allowance for the superdifficulty of the scale, at least in the upper range of ages. F. N. Maxfield[6] has proposed a corrective formula to be used with the Stanford-Binet above chronological age ten. He multiplies the Stanford-Binet Intelligence Quotient by 1.01 for an eleven year old, by 1.02 for a twelve year old, and by 1.18 for a sixteen year old and an adult." This study indicates that the Stanford Revision of the Binet-Simon tests is too difficult for children in the sixth grade to secure an average Intelligence Quotient of 100. A corrective formula of 1.08, or an increase in the Intelligence Quotient of 10.8% would bring the average in this group up to 100. This is only slightly higher than the correction suggested by Maxfield.

[5] J. E. W. Wallin, Clinical and Abnormal Psychology, p. 154.

Since the entire group tends to resemble the twelve year group in the sixth grade, the findings of this study augment the proposal of Maxfield regarding some correction of the Intelligence Quotient for children over ten years of age.

A prefatory note to Chapter V of the The Twenty-seventh Yearbook of the National Society for the Study of Education suggests the advisability of investigating further the tendency of the Intelligence Quotient at the higher ages to be less than 100. This note says, in part, "One fact mentioned in this chapter, but passed over with little comment, would seem well worth further investigation. This is a drop in median I. Q. from 94, at age 10, to 83 at age 14. The author attributes this drop to the 'nature of the test, and not to differences in the sample.' This is appreciably more than the age drop in I. Q. of the original subjects upon whom the Stanford-Binet was standardized. It is to be hoped that the possibility of cumulative environmental influence upon the subjects of this study may sometime be investigated." Harold Ellis Jones points out in this chapter,[6] "In the case of the Stanford Revision material, the intelligence quotients are unfitted for our purposes, owing to the fact that in this rural population the median I. Q. drops steadily from 93.6 at 10 years to 82.7 at 14 years. This is due to the nature of the test, and not to imperfections in the sample." A similar result has been reported by N. D. M. Hirsch, in a recent study of rural children in Kentucky.[7] A decrease in the average I. Q. was found, from 81.0 at 8 years to 73.1 at 13 years.

The average results for all tests show a high degree of reliability. It is practically certain that the true average is included by $\pm$ 4 P.E. Av. The small probable error shown demonstrates the reliability of these measures. It will be observed that the average results for the entire group show the highest degree of reliability of all of the groups.

It may fairly be suggested that the ten year old children in this group are advanced, and that the fourteen year old children are

[6] Harold Ellis Jones, Director of Research, Institute of Child Welfare, Berkeley, Calif., A First Study of Parent-Child Resemblance in Intelligence. *The Twenty-Seventh Yearbook of the National Society for the Study of Education, Nature and Nurture.* Part I, Public School Publishing Company, Bloomington, Illinois, Chapter V, page 67.

[7] N. D. M. Hirsch, A Summary of Some of the Results from an Experimental Study of the East Kentucky Mountaineers. *Proceedings of the National Academy of Science,* Vol. 13, 1927, pp. 18-21.

retarded. If this is so, ten year old children would be expected to show superiority to the fourteen year old children in test scores. It is found that the ten year old children are superior to the fourteen year old children in intellectual tests. The difference in averages is significant in the Intelligence Quotient. The fourteen year old children are superior to the ten year old children in the Witmer Formboard and the Witmer Cylinders, but the differences in averages are not significant.

If the ten year old children are advanced in grade, this will be an indication of superior competency. These children are superior to the fourteen year old children in tests which primarily require organization and discernment. The fourteen year old children are inferior in these fundamental abilities required in mentality, but because of the growth increment, physiological development, and added experience are slightly superior in tests primarily requiring motor efficiency. The fourteen year old children are slightly inferior to the ten year old children in the Dearborn Formboard. This is a formboard test, but requires the use of intellectual processes more than the other formboards do.

The Median Modal Age Group

The median modal age group has been selected by eliminating the upper twenty per cent and the lower twenty per cent from the original age distribution. This will remove those who are the youngest and those who are the oldest in the sixth grade. When the average age of this group is compared with the average age of the entire group, this group is younger. The difference in averages in chronological age between these two groups is significant, but it is small. The median modal age group is on the average 2.6 months younger. The sigma of the distribution and the coefficient of variability is greater for the entire group as can be seen from the comparison of these measures. The median modal age group is more homogeneous in chronological age than the entire group.

When the results for all of the tests are considered the median modal age group shows slightly greater homogeneity than the entire group in all test results. In practically all cases the sigma, and the coefficient of variability is less for the median modal age group. This group does not show as great approximation to the normal curve of distribution in all tests as is found in the entire group, but the difference in amount of skewness of the curves for the two groups is slight.

The median modal age group in the sixth grade is very slightly superior to the entire group in intellectual tests, but the difference in averages is not a significant one. This group is composed of children who are very slightly younger, and therefore very slightly advanced. They are slightly superior in intellectual tests. The difference between the averages in these tests for the two groups is not statistically significant.

In performance tests there is no significant difference between the averages of the results for the two groups. In some cases the entire group is superior, and in others the median modal age group is superior. In no one test is there any significant difference between the average scores. The median modal age group in the sixth grade is not significantly different from the entire group in performance tests.

When the P.E. Av. of the two groups is compared it is seen that the degree of reliability is approximately the same in both groups. In the Witmer Cylinders and the Dearborn Formboard the reliability of the median modal age group is very slightly less.

The median modal age group in the sixth grade does not show a significant difference from the entire group in the results of the tests. There is a small but significant difference in chronological age, the entire group being on the average 2.6 months older. Either of these groups can be used as a standard of performance.

Sex Differences

The girls in the sixth grade are slightly younger than the boys. The difference in average chronological ages is small, being only 2.6 months, and as can be seen from the tables of results this difference is not statistically significant. The girls are very slightly more homogeneous in chronological age.

The boys are very slightly superior to the girls in the intellectual tests, but at no point is there a significant difference between the average scores of the two groups. In general, the boys tend to be superior to the girls in performance tests, and in several instances there is a significant difference in the average scores in favor of the boys. In the first trial of the Witmer Formboard, the second trial of the Witmer Cylinders, and in both trials of the Dearborn Formboard the boys are superior. This is a significant superiority. It is probably due in part to greater motor skill of the boys in manual operations. The boys usually demonstrate a slightly greater competitive spirit in tests, and this will aid in the more

rapid completion of the performance tests. Boys are less prone to give up when the problem causes difficulty. The girls work in a more perfunctory way, and when obstacles are met show less stability than the boys. The girls tend to "blow up" more readily when under pressure. The difference between the boys and girls in performance tests is due to greater motor skill on the part of the boys in this kind of manual operation, and a temperament better adjusted to success in performance tests.

The sigma of the distribution and coefficient of variability are smaller in Mental Age and Intelligence Quotient for the girls. They are slightly more homogeneous than boys in intellectual tests. In all performance tests the sigma of the distribution is slightly less for the boys. The boys in this group show a slightly greater amount of homogeneity than the girls in performance tests. This is probably due to the slightly greater stability of boys in motor operations.

The results of the tests for both of these groups show a high degree of reliability, as will be seen when the P.E.Av. of these groups is compared. The skewness is seen to be similar for both groups, and is similar to that shown in the entire group. This illustrates that the groups are fairly representative of the boys and girls in the sixth grade.

The results obtained from the boys and girls have been compared to those obtained from the entire group. Both of these groups are very similar to the entire group in chronological age. The boys are very slightly older, and the girls are very slightly younger than the entire group, but the differences between the averages are not significant in either case.

In intellectual tests the boys and girls are similar to the entire group. The boys tend to be very slightly superior to the entire group, and the girls tend to be very slightly inferior to the entire group in intellectual tests, but the differences between the averages are not statistically significant. In the memory span auditory forward both groups are similar to the entire group. They are both not significantly different from the entire group in this test.

The girls tend to be slightly inferior to the entire group in performance tests. The differences between the averages is significant in the Witmer Formboard, first trial, Witmer Cylinders, second trial, and the Dearborn Formboard. The boys are superior to the entire group in performance tests. In the Witmer Formboard first trial and Dearborn Formboard the differences in averages are significant.

The amount of skewness is similar in both groups to that shown in the entire group. The sigma of the distribution and the coefficient of variability are similar. These two groups show approximately the same amount of homogeneity. They are both representative of the entire group. The probable error of the averages is approximately the same for the boys and girls as it is for the entire group. The averages of the results for the boys and girls show the same degree of reliability as is found in the entire group.

Six A Grade and Six B Grade

The Six A Grade is the first half of the sixth grade. When a child passes this grade he is promoted to Six B, the second half of the sixth grade. When the results of these two groups are compared it is found that the children in the Six A grade are younger than the children in the Six B grade. The difference in average ages between these two groups is 8.2 months. This is a significant difference. The skewness and coefficient of variability show that the Six A grade is slightly more homogeneous in chronological age than the Six B grade.

The average Mental Age of the children in the Six A grade is 130.7 months, and of the Six B grade is 136.2 months. This is a difference of 5.5 months in favor of the Six B group. This superiority of the Six B children in Mental Age is a significant superiority. This latter group is 8.2 months older than the Six A group in chronological age so that the Intelligence Quotient is approximately the same for the two groups. The Intelligence Quotient is practically the same, the average being one point less for the Six B group. This difference in Intelligence Quotient is not a significant one and can be considered negligible.

The children in Six B are slightly superior to the children in Six A in performance tests. This difference is significant in the Witmer Cylinders, second trial, and the Dearborn Formboard, second trial. The Six B group shows superiority in manual performances.

When the P.E.Av. of these two groups is compared it can be seen that the tests have a high degree of reliability for both of these groups.

It will be observed that the children in the Six A Grade are younger than those in the entire group, and the difference between the averages is significant. The children in Six B are older than those in the entire group and this difference is also a significant one.

The Six B children are older than the children in the Six A Grade and are also older than the children in the entire group. In the results of all tests there is very little difference between the entire group and the children in the Six A and Six B Grade.

In Mental Age the children in Six A are inferior to those in the entire group, and the differences between the averages is significant. The Six B children are slightly superior to those in the entire group in Mental Age, but the difference between the averages in this case is not significant. There is no noticeable difference between the entire group and the Six A and Six B grades in the other intellectual tests.

In the performance tests there is very little difference between these two divisions of the grade and the entire group. The children in Six A grade are very slightly inferior to the entire group in performance tests. This difference in average scores is significant only in the Dearborn Formboard, second trial. The children in Six B are very slightly superior to the Children in the entire group in performance tests, and in this case there is only a significant difference between the averages in the Dearborn Formboard.

The results for the Six A and Six B groups show approximately the same degree of variability as is found in the entire group. These two groups are representative of the entire group in test scores. They show differences in chronological age. The test results for the Six A grade and the Six B grade show the same degree of reliability as is found in the entire group.

General Discussion

This group is fairly representative of all children in the sixth grade in public school. There is a wide distribution of chronological ages in a group of this sort. Some of the children are advanced in school progress, others are retarded. All children in the grade are of normal mentality. On the basis of a social criterion of normality, that is, the ability to maintain one's self in society, to make a living no matter how poor, all children in this group are normal. Neither the writer nor any of the other examiners was of the opinion that any of the children in this group were feebleminded. Some are doubtful in the sense that conditions of unusual stress may force them below the level of social competency. A few showed signs of emotional instability and can be called psychopathic inferiors. None at the time of the examination were considered

abnormal. This is a group which might be expected in any school system.

Successful behavior is the product of organization and discernment, intelligence and efficiency, motivation and control. Those who are most successful possess these attributes in the greatest abundance. The ten year old children demonstrate superiority in those tests which require the use of organization and discernment, the fourteen year old children are inferior in this respect. Efficiency is a function of the age and experience of the individual, and in this the fourteen year old children demonstrate a slight superiority. The younger child in the sixth grade will demonstrate relatively greater ability in the Intelligence Quotient than in the performance tests.

The Dearborn Formboard is solved more rapidly by the younger children of the group. It is difficult enough at this level to require the use of organization and discernment. The Witmer Formboard and the Witmer Cylinders require efficiency. None of the performance tests are difficult enough to be called tests of intelligence at this level.

Girls are inferior to boys in performance tests, but show no differences in the intellectual tests. This may be due to a greater skill of boys in making the manual movements required in these performance tests. Another factor of importance is the manner in which the boys and girls go about the tests. The girls are more cautious on the first trial. They do not begin the performance tests with the same competitive spirit, the same assurance, or the same abandon. After they have tried the test out a little they gain confidence. On the second trial they are not so afraid of making mistakes, and proceed more in the spirit of competition. The girls usually show greater improvement on the second trial than the boys do.

Conclusions

1. All performance tests used are too easy for this group.

2. The Stanford Revision of the Binet-Simon Tests is too difficult for children in the sixth grade to secure an average Intelligence Quotient of 100. The average Intelligence Quotient for the group is 93.1.

3. The sixth grade cannot be definitely called an age level, but it more nearly represents the twelve year level than any other.

4. The median modal age group in the sixth grade is not significantly different from the entire group in performance.

5. There are significant sex differences in the Dearborn Formboard, but not in other tests.

6. The Six A Grade and Six B Grade are not significantly different from the entire group in test results.

7. The Six A Grade is significantly lower than the Six B Grade in Mental Age, but not in other tests.

8. The ten year old children are significantly superior to the fourteen year old children in Mental Age, Intelligence Quotient, and Memory Span.

Bibliography

Easby-Grave, Charlotte. *Tests and Norms at the Six Year Old Performance Level. The Psychological Clinic,* 1924, 15, pp. 261-300.

Garrett, Henry E. *Statistics in Psychology and Education.* New York. Longmans, Green and Co., 1926.

Hirsch, N. D. M. *A Summary of Some of the Results from an Experimental Study of the East Kentucky Mountaineers. Proceedings of the National Academy of Sciences.* 1927, 13, pp. 18-21.

Jones, Harold Ellis. *A First Study of Parent-Child Resemblance in Intelligence. The Twenty-Seventh Yearbook of the National Society for the Study of Education, Nature and Nurture,* Part I, Chapter V.

Leaming, Rebecca E. *Tests and Norms for Vocational Guidance at the Fifteen Year Old Performance Level. The Psychological Clinic,* 1922, 14, pp. 193-220.

Murphy, Miles. *The Ten Year Level of Competency. The Psychological Clinic,* 1928, 17, pp. 33-60.

Taussig, F. W. *Principles of Economics.* New York. The Macmillan Company, 1918, Vol. II, pp. 134-138.

Terman, Lewis M. *The Measurement of Intelligence. The Stanford Revision and Extension of the Binet Simon Intelligence Scale.* New York. Houghton Mifflin Co., 1927.

Wallin, J. E. W. *Clinical and Abnormal Psychology.* New York. Houghton Mifflin Co., 1927.

Witmer, Lightner. *Psychological Diagnosis and the Psychonomic Orientation of Analytic Science. The Psychological Clinic,* 1925, 16, pp. 1-18.

Thurstone, L. L. *The Fundamentals of Statistics.* New York. The Macmillan Co., 1928.

TABLE I
CHRONOLOGICAL AGE

No. of Cases	Group	Mean	σ	Sk.	V.	P.E. Av.	Diff. / σ diff. entire group and sub-group	Diff. / σ diff.
43	10 yr.	127.1	3.5	− .78	2.7	.4	22.9	
164	11 yr.	136.8	3.0	− .20	2.2	1.6	13.9	
96	12 yr.	148.4	3.1	− .10	2.1	.2	3.2	
43	13 yr.	160.7	2.9	+ .72	1.2	.3	18.4	
36	14 yr.	173.6	3.2	− .38	1.8	.4	36.9	
400	entire	145.9	14.9	+ .58	12.4	.5		
240	median							
	mode	143.3	6.4	+ .19	4.5	.3	3.7	
189	Males	147.3	16.3	+ .55	11.1	.8	1.8	1.7 (Males and Females)
211	Females	144.7	14.4	+ .75	9.9	.7	1.7	
186	Six A	141.6	12.7	+ .38	8.9	.6	5.7	5.7 (Six A and Six B)
214	Six B	149.8	16.1	+ .46	10.7	.7	6.1	

TABLE II
MENTAL AGE

No. of Cases	Group	Mean	σ	Sk.	V.	P.E. Av.	Diff. / σ diff. entire group and sub-group	Diff. / σ diff.
43	10 yr.	136.4	15.8	+ .34	11.6	1.6	1.0	2.2 (10 yr. and 14 yr.)
164	11 yr.	137.2	15.5	+ .17	11.3	.8	3.4	
96	12 yr.	131.5	14.1	+ .04	10.7	1.0	2.0	
43	13 yr.	133.1	15.2	− .14	11.5	1.5	.5	
36	14 yr.	128.5	15.8	+ .61	12.3	1.8	2.2	
400	entire	134.1	15.7	+ .13	11.6	.5		
240	median							
	mode	134.6	15.2	+ .15	11.3	.7	.8	
189	Males	135.8	15.9	+ .23	11.8	.8	2.1	2.0 (Males and Females)
211	Females	132.7	15.1	− .02	11.4	.7	1.9	
186	Six A	130.7	14.7	+ .16	11.2	.7	4.3	3.7 (Six A and Six B)
214	Six B	136.2	15.5	+ .14	11.4	.7	2.9	

TABLE III
INTELLIGENCE QUOTIENT

No. of Cases	Group	Mean	σ	Sk.	V.	P.E. Av.	Diff. / σ diff. entire group and sub-group	Diff. / σ diff.
43	10 yr.	107.6	12.7	+ .66	11.8	1.3	7.8	8.6 (10 yr. and 14 yr.)
164	11 yr.	99.9	12.0	+ .33	12.0	.6	7.6	
96	12 yr.	88.3	10.1	+ .21	11.4	.7	4.4	
43	13 yr.	84.2	10.6	+ .65	12.6	1.1	5.5	
36	14 yr.	73.4	9.0	+ .57	12.2	1.0	12.4	
400	entire	93.1	15.9	+ .08	17.1	.5		
240	median							
	mode	94.2	12.5	+ .24	13.3	.5	1.6	
189	Males	94.2	17.2	+ .24	18.2	.8	1.3	1.1 (Males and Females)
211	Females	92.6	14.7	+ .02	14.8	.7	.8	
186	Six A	93.6	15.0	+ .22	16.0	.7	.6	.6 (Six A and Six B)
214	Six B	92.6	16.8	− .02	18.1	.8	.7	

TABLE IV
MEMORY SPAN—AUDITORY

No. of Cases	Group	Mean	σ	Sk.	V.	P.E. Av.	Diff. / σ diff. entire group and sub-group	Diff. / σ diff.
43	10 yr.	6.0	.8	.00	11.8	.08	.9	1.8 (10 yr. and 14 yr.)
164	11 yr.	6.2	.7	+ .85	11.8	.03	3.6	
96	12 yr.	5.9	.8	− .37	13.8	.06	.5	
43	13 yr.	5.9	.9	− .33	14.9	.09	.8	
36	14 yr.	5.8	.8	− .75	13.7	.09	1.6	
400	entire	6.0	.9	.00	14.1	.03		
240	median							
	mode	6.9	.8	− .37	8.9	.03	90.0	
189	Males	6.0	.9	+ .13	15.0	.04	.0	.0 (Males and Females)
211	Females	6.0	.8	+ .08	12.9	.04	.0	
186	Six A	6.1	1.3	+ .23	21.5	.06	2.5	19.0 (Six A and Six B)
214	Six B	5.9	.8	− .37	14.2	.04	10.0	

TABLE V
MEMORY SPAN—VISUAL

No. of Cases	Group	Mean	σ	Sk.	V.	P.E. Av.	Diff. / σ diff. entire group and sub-group	Diff. / σ diff.
43	10 yr.	7.5	.8	+1.8	9.9	.08	3.0	2.2 (10 yr. and 14 yr.)
164	11 yr.	7.4	1.0	+1.2	13.1	.05	5.0	
96	12 yr.	7.1	1.0	+ .30	14.6	.07	1.2	
43	13 yr.	6.8	.8	− .74	12.2	.09	3.3	
36	14 yr.	6.8	.9	− .67	12.6	.10	2.9	
400	entire	7.2	1.0	+ .60	12.5	.03		
240	median							
	mode	7.3	1.0	+ .90	8.9	.03	3.1	
189	Males	7.1	1.0	+ .29	14.6	.05	2.5	1.1 (Males and Females)
211	Females	7.0	1.0	.00	14.1	.05	8.2	
186	Six A	7.2	1.0	+ .60	14.0	.05	.0	2.2 (Six A and Six B)
214	Six B	7.4	1.0	+1.2	13.4	.04	6.3	

TABLE VI
MEMORY SPAN—REVERSE

No. of Cases	Group	Mean	σ	Sk.	V.	P.E. Av.	Diff. / σ diff. entire group and sub-group	Diff. / σ diff.
43	10 yr.	4.2	.8	+ .74	18.3	.08	2.2	4.0 (10 yr. and 14 yr.)
164	11 yr.	4.0	.8	.00	18.9	.04	.9	
96	12 yr.	3.9	.8	− .37	25.5	.06	.0	
43	13 yr.	3.9	.8	− .37	20.4	.08	.6	
36	14 yr.	3.7	.8	−1.1	20.7	.08	3.2	
400	entire	3.9	.6	− .50	16.2	.02		
240	median							
	mode	4.0	±.8	.00	20.2	.03	.9	
189	Males	3.9	.8	− .36	21.5	.04	.0	1.7 (Males and Females)
211	Females	4.0	.8	+ .12	19.1	.04	1.9	
186	Six A	3.9	.8	− .37	20.8	.04	.0	1.4 (Six A and Six B)
214	Six B	4.0	.8	.00	20.6	.04	.9	

TABLE VII
WITMER FORMBOARD—FIRST TRIAL

No. of Cases	Group	Mean	σ	Sk.	V.	P.E. Av.	Diff. / σ diff. entire group and sub-group	Diff. / σ diff.
43	10 yr.	24.2	3.9	− .53	16.3	.4	.3	1.2 (10 yr. and 14 yr.)
164	11 yr.	23.2	6.2	+ .82	26.5	.3	2.1	
96	12 yr.	24.2	6.6	.00	27.1	.4	.3	
43	13 yr.	23.4	6.6	− .05	27.4	.7	.7	
36	14 yr.	23.0	4.9	.00	21.5	.6	1.2	
400	entire	24.0	6.3	+ .11	26.3	.2		
240	median							
	mode	23.7	5.8	+ .42	24.3	.2	1.2	
189	Males	22.6	5.3	+ .06	23.6	.3	4.5	4.0 (Males and Females)
211	Females	25.0	6.8	+ .09	27.2	.3	3.4	
186	Six A	24.2	6.2	+ .20	26.9	.3	.6	1.0 (Six A and Six B)
214	Six B	23.6	6.3	+ .09	26.8	.3	1.4	

TABLE VIII
WITMER FORMBOARD—SECOND TRIAL

No. of Cases	Group	Mean	σ	Sk.	V.	P.E. Av.	Diff. / σ diff. entire group and sub-group	Diff. / σ diff.
43	10 yr.	20.0	4.5	+ .13	16.3	.4	.4	.9 (10 yr. and 14 yr.)
164	11 yr.	20.3	4.1	+ .15	20.2	.2	.4	
96	12 yr.	20.6	4.7	+ .06	22.9	.3	1.0	
43	13 yr.	19.4	4.5	+ .07	22.9	.5	1.2	
36	14 yr.	19.2	4.0	− .23	20.7	.4	1.5	
400	entire	20.2	5.0	+ .24	22.6	.1		
240	median							
	mode	20.2	4.4	− .56	23.6	.2	.0	
189	Males	20.4	4.6	.00	22.4	.2	1.0	.4 (Males and Females
211	Females	20.6	5.0	+ .30	24.3	.2	2.2	
186	Six A	20.3	5.4	.00	26.6	.3	.4	.6 (Six A and Six B)
214	Six B	20.6	5.3	+ .17	25.7	.2	2.3	

TABLE IX
WITMER CYLINDERS—FIRST TRIAL

No. of Cases	Group	Mean	σ	Sk.	V.	P.E. Av.	Diff. / σ diff. entire group and sub-group	Diff. / σ diff.
43	10 yr.	85.8	52.4	+ .62	60.5	5.3	.1	1.3 (10 yr. and 14 yr.)
164	11 yr.	89.3	54.0	+ .94	60.5	2.8	1.4	
96	12 yr.	85.0	37.4	+ .67	44.0	2.6	0.0	
43	13 yr.	73.7	44.8	+ .78	60.8	4.5	1.7	
36	14 yr.	73.3	30.9	+ .56	42.2	3.4	2.2	
400	entire	84.9	51.2	+ .71	60.3	1.7		
240	median							
	mode	83.5	44.0	+ .78	52.7	1.9	.6	
189	Males	79.6	49.0	+ .84	61.6	2.4	2.0	2.1 (Males and Females)
211	Females	90.1	53.2	+ .75	57.9	2.5	2.2	
186	Six A	85.5	40.6	+ .97	46.3	1.9	.2	.2 (Six A and Six B)
214	Six B	84.7	55.4	+ .84	65.3	2.6	.1	

TABLE X
WITMER CYLINDERS—SECOND TRIAL

No. of Cases	Group	Mean	σ	Sk.	V.	P.E. Av.	Diff. / σ diff. entire group and sub-group	Diff. / σ diff.
43	10 yr.	57.3	20.7	+ .91	36.1	2.1	.7	2.0 (10 yr. and 14 yr.)
164	11 yr.	55.6	15.5	+ .16	27.8	.8	.3	
96	12 yr.	55.7	14.6	+ .16	26.2	1.1	.2	
43	13 yr.	53.6	14.6	+ .45	27.3	1.5	.4	
36	14 yr.	49.6	12.9	+ .23	25.7	1.4	2.7	
400	entire	55.4	16.2	+ .39	29.2	.5		
240	median							
	mode	56.1	16.2	+ .09	29.1	.7	.1	
189	Males	51.3	13.8	+ .02	26.9	.7	1.5	4.5 (Males and Females
211	Females	58.2	16.8	+ .52	28.9	.8	3.6	
186	Six A	58.0	17.0	+ .46	29.3	.8	3.0	3.0 (Six A and Six B)
214	Six B	53.1	15.4	+ .51	29.0	.7	2.8	

TABLE XI
DEARBORN FORMBOARD—FIRST TRIAL

No. of Cases	Group	Mean	σ	Sk.	V.	P.E. Av.	Diff. / σ diff. entire group and sub-group	Diff. / σ diff.
43	10 yr.	170.9	82.6	+ .47	47.7	8.4	1.5	1.2 (10 yr. and 14 yr.)
164	11 yr.	184.9	86.4	+ .41	46.7	4.5	.6	
96	12 yr.	186.0	79.4	+ .71	42.7	5.4	.3	
43	13 yr.	196.1	85.4	+ .21	43.5	8.7	.6	
36	14 yr.	204.4	94.8	+ .14	36.4	10.6	1.1	
400	entire	188.2	85.8	+ .56	45.6	2.9		
240	median							
	mode	188.0	83.8	+ .69	44.6	3.6	.1	
189	Males	168.2	79.8	+ .50	47.4	3.9	4.5	4.6 (Males and Females)
211	Females	206.2	86.6	+ .35	41.9	3.9	4.6	
186	Six A	199.9	86.4	+ .52	43.2	4.2	2.6	2.6 (Six A and Six B)
214	Six B	178.0	84.0	+ .61	47.2	3.8	2.6	

TABLE XII
DEARBORN FORMBOARD—SECOND TRIAL

No. of Cases	Group	Mean	σ	Sk.	V.	P.E. Av.	Diff. / σ diff. entire group and sub-group	Diff. / σ diff.
43	10 yr.	96.9	53.6	+ .83	54.3	5.5	2.5	.8 (10 yr. and 14 yr.)
164	11 yr.	132.5	73.4	+ .94	54.7	3.8	3.5	
96	12 yr.	120.8	68.2	+ .99	56.5	4.7	.5	
43	13 yr.	121.2	75.6	+ .71	62.4	7.7	.3	
36	14 yr.	110.5	71.4	+ .78	64.6	7.9	.6	
400	entire	117.6	70.0	+ .82	59.5	2.3		
240	median							
	mode	124.8	70.8	+ .83	56.7	3.1	2.6	
189	Males	103.8	59.4	+ .81	57.2	2.9	3.9	3.9 (Males and Females)
211	Females	130.3	77.6	+ .83	59.4	3.6	4.0	
186	Six A	132.1	71.6	+ .82	54.2	3.5	3.9	3.9 (Six A and Six B)
214	Six B	105.2	65.0	+ .81	61.8	2.9	3.8	

DECILE TABLES

Sixth Grade—Entire Group (400 Cases)

C.A.	M.A.	%	I.Q.	M.S. Aud.	M.S. Vis.	M.S. Rev.	Witmer Fb. I	Witmer Fb. II	Cyl. I	Cyl. II	Drb. Fb. I	Drb. Fb. II	Voc.
9–7	15–4½	100	160.4	9	11	7	13	11	19	16	34	22	66
9–8	14–11	99	132.9	8	10	6	13	13	32	29	45	32	58
10–10	12–11½	90	113.3	7	8	5	18	15	43	37	80	50	46
11–2	12–2	80	105.2	7	8	5	19	16	50	41	103	59	42
11–5	11–8	70	100.9	6	8	4	20	18	56	45	121	70	40
11–7	11–4	60	96.5	6	7	4	21	19	62	48	147	83	36
11–10	11–0	50	92.6	6	7	4	23	20	69	52	172	97	34
12–2	10–8	40	88.8	6	7	4	25	20	75	56	200	109	32
12–6	10–4	30	84.6	6	7	4	25	22	85	60	247	133	30
13–3	10–1	20	79.9	5	6	3	27	23	104	65	F	170	26
14–4	9–7	10	71.9	5	6	3	32	27	136	78	F	224	24
15–8	8–6	1	62.5	4	5	3	45	35	F	101	F	F	20
16–3	8–4	0	60.7	4	4	2	57	55	F(6)*	152	F(90)	F(18)	10

* Numbers in parentheses indicate the number of failures.

Sixth Grade—Males (189 Cases)

C.A.	M.A.	%	I.Q.	M.S. Aud.	M.S. Vis.	M.S. Rev.	Witmer Fb. I	Witmer Fb. II	Cyl. I	Cyl. II	Drb. Fb. I	Drb. Fb. II	Voc.
9–7	15–4½	100	160.4	9	10	7	13	12	24	26	34	22	66
9–8	14–11	99	139.9	9	10	6	13	13	28	29	44	27	58
10–11	13–2	90	115.4	7	8	5	17	15	42	35	74	48	46
11–2	12–4	80	108.0	7	8	5	18	16	46	40	90	55	43
11–4	11–10	70	101.4	6	8	4	19	18	53	43	108	63	40
11–7	11–5	60	96.7	6	7	4	21	19	57	45	125	75	38
12–0	11–1	50	92.9	6	7	4	22	20	63	50	150	85	36
12–4	10–10	40	89.0	6	7	4	23	20	70	53	173	100	34
12–8	10–6	30	84.5	6	7	3	25	22	80	56	202	114	32
13–6	10–2	20	79.2	5	6	3	26	24	92	60	242	141	30
14–5	9–7	10	71.3	5	6	3	30	37	131	68	F	183	26
15–9	8–7	1	62.5	4	5	3	44	32	F	89	F	F	20
16–3	8–4	0	62.4	4	5	2	45	40	F(3)	101	F(29)	F(2)	20

Sixth Grade—Females (211 Cases)

C.A.	M.A.	%	I.Q.	M.S. Aud.	M.S. Vis.	M. S. Rev.	Witmer Fb. I	Witmer Fb. II	Cyl. I	Cyl. II	Drb. Fb. I	Drb. Fb. II	Voc.
9–7	15–0	100	132.8	9	11	7	13	11	19	16	45	33	60
9–8	15–0	99	130.3	8	9	6	13	12	35	28	46	35	58
10–10	12–8	90	111.0	7	8	5	18	16	47	38	86	53	44
11–2	12–0	80	104.1	7	8	5	20	17	55	44	119	63	40
11–5	11–6½	70	100.5	6	8	4	21	18	61	46	141	77	36
11–6	11–4	60	96.4	6	7	4	23	19	66	50	166	90	34
11–9	11–0	50	92.3	6	7	4	24	20	73	55	196	105	32
12–1	10–7	40	88.3	6	7	4	25	20	82	59	242	123	29
12–5	10–2	30	84.6	6	7	4	27	22	91	63	295	157	27
12–11	9–10	20	80.4	5	7	3	29	23	115	72	F	188	24
14–0	9–6	10	72.5	5	6	3	34	27	145	82	F	249	22
15–5	8–6	1	63.8	4	5	2	57	37	F	105	F	F	16
15–10	8–6	0	60.7	4	4	2	57	55	F(3)	152	F(61)	F(16)	10

Sixth Grade—60% Median Modal Age Group (240 Cases)

C.A.	M.A.	%	I.Q.	M.S. Aud.	M.S. Vis.	M.S. Rev.	Witmer Fb. I	Witmer Fb. II	Cyl. I	Cyl. II	Drb. Fb. I	Drb. Fb. II	Voc.
11–2	15–0	100	132.8	9	11	7	13	12	19	16	45	35	58
11–2	14–11	99	131.0	8	10	6	13	14	32	30	61	38	54
11–4	12–11	90	111.2	7	9	5	17	16	46	38	82	54	44
11–5	12–1½	80	108.9	7	8	5	19	17	54	42	104	63	42
11–6	11–8	70	104.7	6	8	4	20	18	58	45	121	74	40
11–8	11–4	60	96.5	6	8	4	21	19	64	50	145	88	38
11–10	11–1	50	93.2	6	7	4	22	20	70	55	168	103	34
12–0	10–9	40	90.0	6	7	4	24	20	75	57	196	115	32
12–3	10–5	30	86.8	6	7	4	25	22	85	61	242	144	30
12–6	10–1	20	83.2	5	6	3	28	23	104	68	F	179	27
12–8	9–7	10	76.2	5	6	3	33	26	132	80	F	227	24
13–2	8–9	1	71.6	4	5	2	44	34	246	98	F	F	18
13–2	8–6	0	67.3	4	4	2	47	40	F(1)	105	F(53)	F(12)	10

Sixth Grade—6A Grade (186 Cases)

C.A.	M.A.	%	I.Q.	M.S. Aud.	M.S. Vis.	M.S. Rev.	Witmer Fb. I	Witmer Fb. II	Cyl. I	Cyl. II	Drb. Fb. I	Drb. Fb. II	Voc.
9–7	14–11	100	140.4	9	10	7	13	14	33	28	60	37	54
9–8	14–11	99	139.9	9	10	6	13	14	37	29	62	40	53
10–8	12–9½	90	113.1	7	8	5	18	16	45	40	81	55	44
11–1	11–10	80	106.3	7	8	5	19	17	50	44	108	68	40
11–3	11–4	70	100.8	6	8	4	21	18	59	48	137	82	38
11–5	11–½	60	95.6	6	7	4	22	19	64	52	165	95	34
11–7	10–9	50	92.5	6	7	4	23	20	70	55	188	107	31
11–9	10–5	40	89.3	6	7	4	25	20	76	58	206	129	30
12–1	10–2	30	85.8	6	7	4	26	21	87	61	275	154	28
12–6	9–10	20	81.3	5	6	3	28	23	105	67	F	182	24
13–3	9–6	10	74.9	5	6	3	32	26	134	78	F	244	22
14–10	8–6	1	64.6	5	5	2	45	35	F	105	F	F	16
14–11	8–6	0	60.7	4	5	2	47	37	F(2)	152	F(53)	F(13)	10

Sixth Grade—6B Grade (214 Cases)

C.A.	M.A.	%	I.Q.	M.S. Aud.	M.S. Vis.	M.S. Rev.	Witmer Fb. I	Witmer Fb. II	Cyl. I	Cyl. II	Drb. Fb. I	Drb. Fb. II	Voc.
9–7	15–4½	100	160.4	9	11	7	13	11	19	16	34	22	66
9–11	15–0	99	132.8	8	10	6	13	12	24	26	44	27	60
11–1	12–11½	90	113.2	7	8	5	17	15	42	36	74	48	46
11–4	12–3½	80	104.3	7	8	5	19	16	50	40	100	55	42
11–7	11–10½	70	100.5	6	8	4	20	18	55	43	116	60	40
11–10	11–6	60	96.8	6	7	4	20	19	60	46	137	75	38
12–2	11–4	50	92.7	6	7	4	23	20	68	50	160	85	36
12–6	11–0	40	88.3	6	7	4	24	20	74	54	178	100	34
12–10	10–8	30	83.8	6	7	4	25	22	84	58	220	110	32
13–7	10–2	20	78.6	5	7	3	27	24	97	63	282	142	29
14–6	9–9	10	70.6	5	6	3	31	27	136	75	F	195	26
15–10	8–9	1	62.5	4	5	3	57	40	F	95	F	F	20
16–3	8–4	0	61.0	4	4	2	57	55	F(4)	101	F(37)	F(5)	20

Sixth Grade—11 Yr. Group (164 Cases)

C.A.	M.A.	%	I.Q.	M.S. Aud.	M.S. Vis.	M.S. Rev.	Witmer Fb. I	Witmer Fb. II	Cyl. I	Cyl. II	Drb. Fb. I	Drb. Fb. II	Voc.
11–0	15–0	100	132.9	9	11	6	13	13	35	29	45	32	58
11–0	15–0	99	132.8	9	10	6	14	14	36	30	46	35	56
11–1	13–1½	90	116.8	7	9	5	18	16	45	38	80	52	46
11–2	12–4	80	109.6	7	8	4	19	17	54	42	97	61	42
11–3	11–11	70	104.3	6	8	4	20	18	59	45	120	75	40
11–4	11–7	60	101.4	6	8	4	21	19	64	49	147	88	38
11–5	11–4	50	98.5	6	7	4	22	20	72	55	169	101	34
11–6	11–0	40	95.6	6	7	4	24	20	80	56	191	109	32
11–7	10–7	30	92.5	6	7	4	25	22	90	60	235	133	30
11–9	10–2	20	89.4	6	7	3	27	23	110	65	F	180	28
11–10	10–0	10	86.0	5	6	3	32	26	153	76	F	232	24
11–11	9–0	1	77.1	4	5	2	43	32	F	103	F	F	20
11–11	8–6	0	71.8	4	5	2	47	35	F(3)	105	F(37)	F(9)	18

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